Claims:

What is claimed is:

1. An infrared light condensing apparatus, characterized in that it comprises:

a solid immersion lens for accepting an incident light or emitting an outgoing light, said solid immersion lens having a base plane on which a specimen is to be disposed;

an antenna having a probe disposed away from a base plane of said solid immersion lens at a distance not more than 1/4 of an effective wavelength of the light;

a holder means for retaining said antenna; and

a position control means for controlling the position of a tip of said probe by means of said holder means,

whereby operating said position control means allows:

the incident light to concentrate as a near-field at a desired position of the specimen on the base plane of said solid immersion or

a near-filed from a desired position of the specimen to be converted into a propagating wave corresponding thereto and then the propagating wave to be emitted as said outgoing light from said solid immersion lens.

2. An infrared light condensing apparatus as set forth in claim 1, characterized in that said solid immersion lens is composed of a medium that is low in absorption coefficient and large in dielectric constant for wavelengths of said incident or outgoing light.

3. An infrared light condensing apparatus as set forth in claim 1 or 2, characterized in that said antenna is made of an electric conductor having a length that is one half of the effective wavelength of said incident or outgoing light

to condense the incident light upon causing it to geometrically resonate or

to pick up a near-field from said specimen in a region of the pointed tip of said probe upon causing it to geometrically resonate

and then to emit it as a wave propagating in the medium of said solid immersion lens.

4. An infrared light condensing apparatus as set forth in any one of claims 1 to 3, characterized in that the tip of said probe is a sharply pointed end of a rod-like electric conductor having a radius of curvature less than a diffraction limit of said incident or outgoing light and is configured to project from said electric conductor towards said specimen

to cause the geometrically resonating incident light condensed on said antenna to concentrate as a near-field at said probe tip or

to take out a near-field from a surface of said specimen.

5. An infrared light condensing apparatus as set forth in any one of claims 1 to 4, characterized in that said holder means comprises an arm and said position control means comprises a triaxial XYZ mechanical stage.

6. An infrared light condensing apparatus as set forth in any one of claims 1 to 4, characterized in that said holder means comprises a cantilever having a rear face reflecting an incident laser light and said position control means is adapted to respond to a change in angle of reflection of the laser light at the cantilever rear face for controlling the distance between said probe tip and the surface of said specimen.

7. (Amended) An infrared light condensing apparatus characterized in that it comprises:

a solid immersion lens for accepting an incident light or emitting an outgoing light, said solid immersion lens having a high refractive index in a wavelength region of infrared or microwave;

an antenna disposed on a base plane of said solid immersion lens;

a cantilever for retaining a specimen adjacent to said antenna;

a position control means for controlling the position of said

cantilever,

whereby operating said position control means allows:

the incident light to concentrate as a near-field at a desired position of the specimen retained by said cantilever or

a near-filed from a desired position of the specimen to be converted into a propagating wave corresponding thereto and then the propagating wave to be emitted as said outgoing light from said solid immersion lens.

8. (Deleted)

9. (Amended) An infrared light condensing apparatus as set forth in claim 7, characterized in that said antenna is a planar dipole antenna or a planar slot antenna disposed on a base plane of said solid immersion lens in a region of its focal position

to condense said incident light upon causing it to geometrically resonate and then to concentrate it as a near-field at said focal position or

to pick up a near-field from a position of said specimen adjacent to said focal position upon causing it to geometrically resonate and then to emit it as a wave propagating in the medium of said solid immersion lens.

10. An infrared light condensing apparatus as set forth in claim 9, characterized in that said planar dipole antenna is a bowtie antenna made of a pair of essentially triangular electric conductors whose apexes are opposed to each other at a small distance less than a diffraction limit of said incident or outgoing light, the bowtie antenna having a total length that is one half of an effective wavelength of said incident or outgoing light.

11. An infrared light condensing apparatus as set forth in claim 9, characterized in that said planar slot antenna is a bowtie antenna made of an electric conductor having a pair of generally triangular windows formed therein whose apexes are opposed to each

other at a small distance less than a diffraction limit of said incident or outgoing light, the bowtie antenna having a total length that is one half of an effective wavelength of said incident or outgoing light.

12. (Amended) An infrared light condensing apparatus, characterized in that it comprises:

a solid immersion lens for accepting an incident light or emitting an outgoing light, said solid immersion lens having a high refractive index in a wavelength region of infrared or microwave;

an antenna disposed on a base plane of said solid immersion lens;

an arm for retaining a specimen adjacent to said antenna;

a triaxial XYZ mechanical stage for controlling the position of said arm,

whereby operating said triaxial XYZ mechanical stage allows:

the incident light to concentrate as a near-field at a desired position of the specimen retained by said arm or

a near-filed from a desired position of the specimen to be converted into a propagating wave corresponding thereto and then the propagating wave to be emitted as said outgoing light from said solid immersion lens.

13. (Deleted)

14. (Deleted)

15. (Added) An infrared light condensing apparatus as set forth in claim12, characterized in that said antenna is a planar dipole antenna or a planar slot antenna disposed on a base plane of said solid immersion lens in a region of its focal position

to condense said incident light upon causing it to geometrically resonate and then to concentrate it as a near-field at said focal position or

to pick up a near-field from a position of said specimen adjacent to said focal position upon causing it to geometrically

resonate and then to emit it as a wave propagating in the medium of said solid immersion lens.

16. (Added) An infrared light condensing apparatus as set forth in claim 15, characterized in that said planar dipole antenna is a bowtie antenna made of a pair of essentially triangular electric conductors whose apexes are opposed to each other at a small distance less than a diffraction limit of said incident or outgoing light, the bowtie antenna having a total length that is one half of an effective wavelength of said incident or outgoing light.

17. (Added) An infrared light condensing apparatus as set forth in claim 15, characterized in that said planar slot antenna is a bowtie antenna made of an electric conductor having a pair of generally triangular windows formed therein whose apexes are opposed to each other at a small distance less than a diffraction limit of said incident or outgoing light, the bowtie antenna having a total length that is one half of an effective wavelength of said incident or outgoing light.